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## ARITHMETIC.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

### SOLUTIONS OF PROBLEMS.

57. Proposed by L. B. FRAKER, Weston, Ohio.

Suppose that in a meadow the grass is of uniform quality and growth and that 6 oxen or 10 colts could eat up 3 acres of the pasture in  $\frac{1}{2}$  of the time in which 10 oxen and 6 colts could eat up 8 acres; or that 600 sheep would require  $2\frac{1}{7}$  weeks longer than 660 sheep to eat up 9 acres.

In what time would an ox, a colt and a sheep together eat up an acre of the pasture on the supposition that 589 sheep eat as much in a week as 6 oxen and 11 colts? By Arithmetic, if possible.—Hunter's Arithmetic. (Unsolved in *School Visitor*.)

II. Solution by Henry Heaton, M. S., Atlantic, Iowa.

Since 6 oxen=10 colts, 1 ox= $1\frac{2}{3}$  colts, and 6 oxen and 11 colts=21 colts=589 sheep.  $\therefore$  1 colt= $28\frac{1}{21}$  sheep and 1 ox= $1\frac{2}{3} \times 28\frac{1}{21}$  sheep= $46\frac{4}{3}$  sheep.

10 oxen and 6 colts= $22\frac{2}{3}$  colts, eat 8 acres of grass in the same time that  $\frac{1}{2}$  of  $22\frac{2}{3}$  colts or  $2\frac{5}{6}$  colts eat 1 acre, and  $3\frac{1}{2}$  colts eat an acre in the same time that 10 colts eat 3 acres. Hence  $3\frac{1}{2}$  colts eat an acre in  $\frac{1}{3}$  the time that  $2\frac{5}{6}$  colts eat it. In  $\frac{1}{3}$  the time  $3\frac{1}{2}$  colts eat as much grass as  $\frac{1}{3}$  of  $3\frac{1}{2}$  colts or  $2\frac{5}{6}$  colts would eat it in the full time. The difference between  $2\frac{5}{6}$  colts and  $3\frac{1}{2}$  colts is  $\frac{1}{3}$  of a colt. The difference in the grass eaten by them is  $\frac{1}{3}$  of the growth. Hence  $\frac{1}{3}$  of a colt eats  $\frac{1}{3}$  of the growth. Hence to eat all the growth will require  $2\frac{5}{6}$  of  $\frac{1}{3}$  of a colt or  $\frac{5}{2}$  of a colt= $\frac{5}{2} \times 28\frac{1}{21}$  sheep= $43\frac{5}{6}$  sheep. To eat the growth on 9 acres will require 9 times  $43\frac{5}{6}$  sheep=390 $\frac{5}{6}$  sheep.  $600-390\frac{5}{6}=209\frac{5}{6}$ .  $660-390\frac{5}{6}=269\frac{5}{6}$ . Hence it will require  $209\frac{5}{6}$  sheep  $2\frac{1}{7}$  weeks longer to eat the original grass on 9 acres than it will  $269\frac{5}{6}$  sheep to eat the same. Hence  $209\frac{5}{6}$  sheep eat in the  $2\frac{1}{7}$  weeks what the 60 other sheep eat in the first part of the time. Hence this time is  $209\frac{5}{6} \times 2\frac{1}{7} \text{ weeks} \div 60 = 9\frac{1}{6}$  weeks. Hence it will take  $269\frac{5}{6}$  sheep  $9\frac{1}{6}$  weeks to eat the original grass on 9 acres. To eat 1 acre will require them  $1\frac{9}{6}$  weeks.

An ox, a colt, and a sheep=75 $\frac{5}{6}$  sheep.

If 75 $\frac{5}{6}$  sheep were eating on one acre,  $43\frac{5}{6}$  sheep would eat the growth leaving  $32\frac{1}{6}$  sheep to eat the original grass. If it require  $269\frac{5}{6}$  sheep  $1\frac{9}{6}$  weeks to do this, it will require  $32\frac{1}{6}$  sheep  $(269\frac{5}{6} \div 32\frac{1}{6}) \times 1\frac{9}{6}$  weeks= $9\frac{3}{6}$  weeks.

58. Proposed by B. F. FINKEL, A. M., Professor of Mathematics and Physics, Drury College, Springfield, Missouri.

Two men, A and B, in Boston, hire a carriage for \$25, to go to Concord, N. H., and back, the distance being 72 miles, with the privilege of taking in three more persons. Having gone 20 miles, they take in C; at Concord, they take in D; and when within 30 miles of Boston, they take in E. How much shall each man pay? [From *Greenleaf's National Arithmetic*.]